

# EXAMINATION OUTLINE FOR TRAFFIC ENGINEERING LICENSING EXAMINATION

## CONTENT AREA: TRANSPORTATION FACILITIES PLANNING (34.99%)

### *Subcategory 1: Circulation, Trip Generation, Parking, and Land Use (17.96%)*

<b>Summary of activities:</b> The traffic engineer applies knowledge of roadway geometrics, capacity, travel forecasting, and facility constraints to determine the impacts of land uses for developments/projects. The traffic engineer makes recommendations for mitigation of impacts. The traffic engineer applies knowledge of the various transportation modes to determine their compatibility and relationship to the design of facilities for safe and optimal operation.	
TASK STATEMENTS	ASSOCIATED KNOWLEDGE
T1. Perform traffic impact studies to determine traffic compatibility with land use and infrastructure. T2. Utilize travel demand models to assist in determining system impacts. T3. Prepare circulation element of Specific/General plans to be consistent with state and federal requirements. T4. Develop forecasting models to determine future travel demand. T5. Recommend roadway mitigations based on forecast of transportation demands to improve level of service. T6. Determine optimum phasing of improvement projects. T7. Develop circulation plans for incorporating transit, trucking, bicycle, and pedestrian facilities into transportation networks. T8. Design local street networks to provide access to individual land parcels. T9. Conduct site access analyses to determine design characteristics and placement of driveways. T10. Evaluate standards and operational constraints to determine opportunities for bicycle facilities. T11. Determine parking demand based on proposed land use. T12. Recommend parking mitigation strategies based on analysis of demand for facility.	K1. Knowledge of methods for determining trip generation, distribution, modal split, and assignment for various land uses. K2. Knowledge of techniques for calculating level of service of roadways and intersections. K3. Knowledge of warrants that define minimum requirements for installation of traffic controls. K4. Knowledge of the relationship between roadway classification/intersection geometrics and carrying capacity. K5. Knowledge of the relationship between model input and output. K6. Knowledge of federal and state requirements pertaining to traffic circulation for developments/projects. K7. Knowledge of parameters for determining the interaction between various land uses. K8. Knowledge of the relationship between roadway classifications and travel speed in assigning traffic to networks. K9. Knowledge of methods for determining passenger car equivalents for trucks, buses, and other vehicle types. K10. Knowledge of techniques for mitigating traffic impacts. K11. Knowledge of physical, operational, and design standards for pedestrian and bicycle travel. K13. Knowledge of the relationship between traffic carrying capacity of roadways, land use, and the level of access provided. K14. Knowledge of roadway features that affect capacity. K15. Knowledge of vehicle queuing concepts pertaining to access points. K16. Knowledge of standards for the design and placement of driveways. K17. Knowledge of the relationship between parking demand and individual land uses. K18. Knowledge of parking management strategies to prevent operational conflicts. K19. Knowledge of methods for controlling parking demand to overcome physical constraints.

## CONTENT AREA: PLANNING (Continued)

### *Subcategory 2: Level of Service and Capacity (10.86)*

<b>Summary of Activities:</b> The traffic engineer conducts analyses of roadways and other transportation facilities to determine traffic volumes, capacity, delay, and other associated transportation factors. The traffic engineer evaluates the relationship between travel modes, travel time, and convenience in relation to transportation system management.	
TASK STATEMENTS	ASSOCIATED KNOWLEDGE
T14. Evaluate traffic volume data to determine infrastructure design. T15. Evaluate development projects for on- and off-site geometrics to determine operational efficiency and safety of traffic flow. T16. Specify transportation infrastructure configurations to meet level of service requirements. T17. Conduct corridor analyses of alternative modes of travel to determine optimum transportation infrastructure. T18. Develop Transportation System Management (TSM) measures to optimize carrying capacity of roadways.	K20. Knowledge of the effects of transit operations on roadway capacity. K21. Knowledge of the effects of vehicle characteristics and volumes on roadway infrastructure. K22. Knowledge of the relationship between travel time, cost, and convenience of travel mode use. K23. Knowledge of methods for determining capacity in weaving and ramp merge/diverge areas. K24. Knowledge of interchange types to accommodate various traffic volumes and physical constraints. K25. Knowledge of the effects of various Transportation System Management (TSM) measures on capacity of roadways.

### *Subcategory 3: Evaluation of Traffic-Related Impacts (6.17%)*

<b>Summary of Activities:</b> The traffic engineer evaluates the effects of implementing projects on roadway congestion, environmental resources, and travel mode choices. The traffic engineer evaluates the relationship between traffic and pollutant levels, costs and benefits, and travel demand management measures.	
TASK STATEMENT	ASSOCIATED KNOWLEDGE
T19. Determine environmental impacts of traffic-related changes. T20. Evaluate traffic changes to determine effectiveness in reducing environmental impacts. T22. Identify economic impacts of alternate strategies in making design recommendations. T23. Identify Transportation Demand Management (TDM) measures that can be used to mitigate traffic impacts.	K27. Knowledge of methods to reduce traffic-related environmental impacts. K29. Knowledge of methods to calculate cost-benefit ratios for design alternatives. K30. Knowledge of the relationship between Transportation Demand Management (TDM) measures and trip reduction potential.

## CONTENT AREA: DESIGN (29.47%)

### *Subcategory 1: Transportation Facilities Design (20.45%)*

<b>Summary of Activities:</b> The traffic engineer applies knowledge of traffic, mode of transportation, and roadway characteristics to develop geometrics, signing, striping, and traffic control plans. The traffic engineer evaluates the need for and specifies parking facility layouts. The traffic engineer recommends design parameters for bicycle and transit facilities. The traffic engineer recommends traffic calming measures based on safety needs and roadway designations.	
TASK STATEMENTS	ASSOCIATED KNOWLEDGE
T24. Develop alternative freeway, interchange, and intersection design concepts based on traffic demands and physical constraints. T25. Conduct analyses of traffic characteristics and physical conditions to determine roadway design. T26. Develop intersection channelization plans to facilitate movements of vehicles and pedestrians. T27. Develop plans for roadway signing and striping to facilitate the movement of traffic. T29. Evaluate freeway and interchange traffic volumes to determine design characteristics. T30. Evaluate geometrics for roadway weaving/transitions to determine level of service. T31. Calculate traffic indices (TIs) from vehicle classification data to be used in pavement design. T32. Recommend parameters for roadway design based on traffic characteristics and physical conditions. T33. Prepare construction area control plans to facilitate traffic flow. T34. Prepare parking facility layout to maximize efficiency and circulation. T35. Apply Americans with Disabilities Act (ADA) specifications to determine design parameters that comply with requirements.	K31. Knowledge of the relationship between motorist characteristics and sight distance requirements. K32. Knowledge of methods for applying roadway design elements. K33. Knowledge of the effect of vehicle turning radii for vehicle classifications in determining roadway characteristics. K35. Knowledge of channelization standards for intersections to regulate traffic movement. K36. Knowledge of the standards for the identification and placement of signing and striping elements. K39. Knowledge of methods for developing indices for truck traffic used to determine the structural section of pavement. K40. Knowledge of the standards for guiding traffic through construction and maintenance zones. K41. Knowledge of the relationship between geometric elements of parking facilities and circulation efficiency. K42. Knowledge of methods for maximizing parking supply under physical layout constraints. K43. Knowledge of methods for parking lot operation to control ingress and egress. K44. Knowledge of statutes and guidelines regarding accommodations for individuals with disabilities as they apply to the design of traffic-related facilities. K45. Knowledge of the effects of bicycle operating characteristics on the design of traffic facilities.

## CONTENT AREA: DESIGN (Continued)

### *Subcategory 2: Traffic Signals and Lighting (9.02%)*

<b>Summary of Activities:</b> The traffic engineer evaluates traffic flow and applies design standards to develop traffic signal and street lighting systems. The traffic engineer conducts traffic signal warrant studies and evaluates signal phasing to optimize traffic flow.	
TASK STATEMENTS	ASSOCIATED KNOWLEDGE
T36. Evaluate need for lighting systems to provide levels of illumination. T37. Specify synchronization of traffic signal systems to optimize traffic flow. T38. Prepare traffic signal timing plans that comply with applicable standards to regulate the movement of traffic. T39. Determine application of Intelligent Transportation System (ITS) technology based on existing or projected traffic conditions. T40. Determine signal phasing to prevent traffic conflicts and to optimize traffic flow.	K46. Knowledge of the principles of illumination and of lighting standards as they pertain to roadways and other transportation facilities. K47. Knowledge of the relationship between traffic flow and the development of signal timing plans. K48. Knowledge of the interaction between time, space, and the movement of vehicles through intersections. K49. Knowledge of the standards that apply to the selection of signal type and placement. K50. Knowledge of procedures for applying warrants/standards used to justify the implementation of traffic control devices. K51. Knowledge of techniques for implementing Intelligent Transportation Systems (ITS) technology to improve traffic flow. K52. Knowledge of the relationship between signal phasing and the control of right-of-way through intersections.

## CONTENT AREA: OPERATIONS (35.54%)

### *Subcategory 1: Traffic Controls (19.62%)*

**Summary of Activities:** The traffic engineer applies knowledge of the relationship between signal cycle lengths, splits, offsets, and phasing to optimize traffic flow. The traffic engineer evaluates traffic volumes, accidents, and physical conditions in developing plans for traffic control devices. The traffic engineer applies traffic control plans to facilitate safe and efficient movement of traffic.

TASK STATEMENTS	ASSOCIATED KNOWLEDGE
<p>T41. Develop signal-timing plans for coordinated systems to direct traffic flow.</p> <p>T42. Develop signal-timing plans for isolated intersections to direct traffic flow.</p> <p>T43. Conduct warrant analyses to provide justification for traffic controls.</p> <p>T44. Identify need for traffic control device modifications based on accident rates, traffic volumes, and changes in traffic patterns.</p> <p>T45. Develop emergency vehicle priority by providing preemptive operating controls.</p> <p>T47. Conduct before-and-after studies to evaluate effects of changes in roadway geometrics or traffic controls.</p> <p>T48. Specify signs, markings, and delineators to regulate, warn, and guide motorists.</p> <p>T49. Conduct engineering and traffic surveys to determine speed limits.</p> <p>T50. Apply applicable statutes and guidelines to traffic operation situations.</p> <p>T52. Determine traffic signal operation needed to clear vehicles from railroad crossings.</p>	<p>K53. Knowledge of the relationship between cycle length, splits, and offsets.</p> <p>K54. Knowledge of the standards for determining intersection signal timing based on traffic and pedestrian requirements.</p> <p>K55. Knowledge of equipment used to detect traffic movements at intersections.</p> <p>K56. Knowledge of the effects of phasing on signal timing.</p> <p>K57. Knowledge of the relationship between signal timing/phasing and accident mitigation.</p> <p>K58. Knowledge of preemption implementation that minimizes intersection hazards.</p> <p>K59. Knowledge of factors to evaluate when analyzing data in before-and-after studies.</p> <p>K60. Knowledge of elements to be evaluated when performing traffic control studies.</p> <p>K61. Knowledge of priority implementation that minimizes intersection hazards.</p> <p>K63. Knowledge of the procedures for conducting and interpreting traffic engineering studies.</p> <p>K64. Knowledge of measures that remedy safety and operational deficiencies.</p> <p>K65. Knowledge of the laws, regulations, and guidelines pertaining to traffic.</p>

## CONTENT AREA: OPERATIONS (Continued)

### *Subcategory 2: Bicycles, Pedestrians, and Parking (4.28%)*

<b>Summary of Activities:</b> The traffic engineer incorporates bicycle, pedestrian, and parking demand in the design and operation of transportation systems. The traffic engineer evaluates pedestrian and bicycle safety and the factors that affect traffic flow and traffic control devices.	
TASK STATEMENTS	ASSOCIATED KNOWLEDGE
T53. Analyze field survey data to determine suitability of street system for bicycle facilities. T54. Evaluate existing curb utilization to determine the need for curbside parking controls. T55. Evaluate existing parking demand characteristics to determine sufficient spaces. T58. Analyze land use and pedestrian flow patterns to determine need for traffic controls in school zones.	K67. Knowledge of bicycle facility design for coordination of traffic based on roadway characteristics and demands. K70. Knowledge of the effect of roadway characteristics on pedestrians. K72. Knowledge of warrants pertaining to traffic control implementation in school zones. K73. Knowledge of methods for determining suggested routes and crossing protections in school zones. K74. Knowledge of the relationship between occupancy, turnover, and mean duration in evaluating parking demand. K75. Knowledge of methods for conducting parking studies to address parking problems. K76. Knowledge of criteria for assigning curb lane designations to accommodate temporary vehicle storage/parking. K77. Knowledge of the relationship between land use and parking demand. K78. Knowledge of the effect of driveway design and operation on the adjacent street. K79. Knowledge of design characteristics for developing plans for curbside designations. K80. Knowledge of criteria for designing curbside parking to accommodate motorists with disabilities.

## CONTENT AREA: OPERATIONS (Continued)

### *Subcategory 3: Traffic Flow (11.64%)*

<b>Summary of Activities:</b> The traffic engineer applies knowledge of traffic flow to the operation of freeways, arterials, and local streets. The traffic engineer evaluates roadway deficiencies and recommends corrective measures. The traffic engineer evaluates traffic conditions and makes recommendations on traffic calming measures.	
TASK STATEMENTS	ASSOCIATED KNOWLEDGE
T59. Recommend traffic-calming strategies to reduce problematic traffic patterns. T60. Conduct studies to determine alternative mitigation strategies for traffic-related problems. T63. Modify striping patterns to improve efficiency of traffic flow. T65. Conduct site-specific studies to determine safety deficiencies. T66. Recommend corrective measures to reduce accident potential/occurrences.	K81. Knowledge of traffic calming measures that reduce traffic volume and speed. K82. Knowledge of the effects of traffic calming measures on adjoining arterials. K83. Knowledge of the effects of traffic calming implementation on the environment. K84. Knowledge of procedures for collecting and analyzing data of traffic-related incidents/impacts. K85. Knowledge of measures for optimizing traffic flow. K90. Knowledge of types of pavement striping based on roadway characteristics and prevailing conditions. K91. Knowledge of methods for developing truck routes to minimize adverse impacts. K96. Knowledge of methods for identifying hazardous traffic locations/conditions. K97. Knowledge of traffic engineering measures for improving roadway safety. K98. Knowledge of methods for evaluating the effectiveness of safety improvement measures. K99. Knowledge of the relationship between roadway characteristics and accident potential.